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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

CROWELL, ANNA M

ART UNIT PAPER NUMBER

1763

9

DATE MAILED: 06/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/842,000

Applicant(s)

OTSUBO, TORU

Examiner

Michelle Crowell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 March 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 7, and 8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 7 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Specification

1a. The substitute specification filed November 29, 2001 has not been entered because it does not conform to 37 CFR 1.125(b) because: a complete specification (non-marked up version) is not provided. Note. The marked up version was received in the amendment date March 20, 2003.

1. The amendment filed March 20, 2003 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

On page 27, line 11, a transformer 29 that is **floated with respect to the ground.**

On page 28, line 14, the output of the bias power supply 17 is **floated with respect to the ground.**

The original specification supports that the transformer 20 is separated from the ground and that the output of the bias power supply 17 is separated from the ground.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 7 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described

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in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Line 6 of claim 7 recites the limitation, "a RF bias circuit **which is floated with respect to ground** so as to send RF current to the substrate to be processed". There is no support for this limitation in the original specification. On page 30, lines 6-7 of the specification, the specification supports a "RF bias circuit that is connected to a radio frequency power.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 8 recites the limitation, "a means to process plasma using the generated plasma" which is unclear, since the specification fails to specifically describe this means.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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8. Claims 1-3, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otsubo et al. (Japanese Patent Publication 11-260596) in view of Tobe et al. (U.S. 5,891,349).

Referring to Drawing 1 and 16, and paragraphs [0113]-[0130], Otsubo discloses a plasma processing apparatus comprising a plasma processing gas supply means, an exhaust air means [0114], plasma generating means and capacitively coupled discharge means consisting of mutually isolated conductors (counterelectrodes 71a 71b 71c) [0115], a magnetic field forming means (a coil 58) [0131], and electromagnetic wave radiating means (counterelectrodes with RF generators 81 and 82), a capacitor 83, and a stage electrode 52. Insulating materials 80a 80b 80c mutually insulates each of the counterelectrodes 71a 71b 71c, thereby creating mutually isolated multiple conductors [0115].

A high-frequency voltage 81 and 82, whose phase can be shifted by a capacitor 83 (frequency displacement current control means), is supplied to the counterelectrodes 71, thereby generating electromagnetic waves. The power of electromagnetic waves radiates through the insulators and counterelectrodes (radio frequency displacement). A resonant circuit is formed via the insulators 80 and the capacitor 83. The signal generator 97 (electromagnetic wave power control means) controls the phase of the high-frequency signal [0130]. Alternately, the electromagnetic waves can be generated by antenna 11 [0041].

Specifically, the distribution of the plasma density can be controlled by controlling the radiated electromagnetic waves based on the adjustment of the phase of the high-frequency voltage supplied to the counterelectrodes 71. Moreover, the distribution of the plasma density due to capacitive coupled plasma can be controlled by controlling the outputs of the high frequency power supplies 81 and 82 (means to control plasma distribution [0131]).

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Regarding claims 7 and 8, a means to send RF current (bias power supply 56) to a substrate 55 [0122].

Regarding claim 8, multiple RF current conducting means (counterelectrodes 71a 71b 71c) are installed at a position opposite to a position where the substrate 55 to be processed is mounted. The multiple RF current conducting means are provided with a means (filters) to control a ratio of RF current flowing from the substrate to be processed to each of the RF current conducting means. Moreover, each counterelectrodes 71a 71b 71c is grounded through low pass filters (not shown), and a high-frequency current from a bias power supply 56 is allowed to flow through each of the counterelectrodes 71a 71b 71c [0116]. Thus, the filter controls the ratio of RF current flowing from the substrate to each of the counterelectrodes 71a 71b 71c.

Otsubo fails to specifically teach an electromagnetic wave power control means and a radio frequency displacement current control.

Referring to Figures 1 and 8, column 10, lines 6-57, and column 14, lines 17-30, Tobe teaches a plasma processing apparatus comprising an electromagnetic wave radiating means (electrode 61) which includes a radiated electromagnetic wave power control means (variable capacitor controller 105) to control the radiated electromagnetic waver power through radio frequency displacement control means (variable capacitor 81a) forming a resonant circuit. Variable capacitors are used to control the electrode's potential. The controller is used to more precisely control the inputs/outputs of the variable capacitors. Thus, it would have been obvious to one of ordinary skill in the art to provide electromagnetic wave radiating means of Otsubo with the electromagnetic wave power control means and a radio frequency displacement current

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control as taught by Tobe. This would precisely control the potential of the electromagnetic wave radiating means, and thus control the plasma distribution.

Otsubo fails to teach a means to store and a means to control plasma distribution.

Regarding claim 3, column 10, lines 45-57, Tobe discloses a plasma processing apparatus having a variable capacitor controller which includes a CPU. The CPU is capable of storing a processing procedure to control distribution during plasma processing, and thus control plasma distribution according to the processing procedure stored. Therefore, it would have been obvious to one of ordinary skill in the art to provide electromagnetic wave radiating means of Otsubo with the means to store and means to control plasma distribution as taught by Tobe. This would precisely control the potential of the electromagnetic wave radiating means, and thus control the plasma distribution.

Response to Arguments

9. Applicant's arguments with respect to claims 1-3, 7, and 8 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Shan et al., Sorensen et al., Nakano et al., and Kurasaki et al. disclose electromagnetic wave power control means. Sakamoto et al. teaches a filter.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (703) 305-1956. The examiner can normally be reached on M-F (8:00 - 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

AMC
June 2, 2003

Luz L. Alejandro
Luz L. Alejandro
Primary Examiner
Art Unit 1763